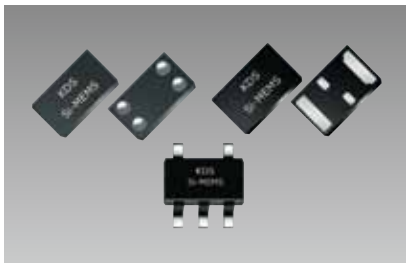
32 kHz MEMS Oscillators / 32 kHz TC-MO -µPower

MO1532/MO1552/MO1630/MO1566/MO1568



■Features

- Fixed 32.768 kHz
- Ultra-low power
- Internal filtering eliminates external Vdd bypass cap

■ Applications

- Mobile Phones, Tablets
- Health and wellness monitors, Fitness Watches
- Pulse-per- second timekeeping, RTC reference clock
- Battery Management Timekeeping

Pb-Free

RoHS Compliant

Model	Output Frequency (kHz)	Frequency Tolerance ($\times 10^{-6}$)	Supply Voltage (V)	Current Consumption (μA Typ.)	Size (mm)	Output
MO1532	32.768	±10 room; 75, 100 over temp.	+1.2 to +3.63	+0.90	1.5×0.8×0.6 (CSP)	NanoDrive™ LVCMOS
MO1552 TC-MO		±5, ±10, ±20 over temp.	+1.5 to +3.63	+0.99		
MO1630 -40 to +105℃		±20 room; ±75,100,150 over temp.		+1.00	2.0×1.2×0.6 (QFN) 2.9×2.8×1.3 (SOT23-5)	LVCMOS
MO1566 Super TC-MO		±3, 5 all inclusive	+1.8	+4.5	1.5×0.8×0.6 (CSP)	
MO1568 Super TC-MO		±5 all inclusive After Overmold/Underfill				

■ Standard Specification (MO1532)

Item	Legend	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	Fout		32.768		kHz	
Supply Voltage	Vdd	+1.2	-	+3.63	V	T_A = -10℃ to +70℃
		+1.5	-	+3.63		T_A = -40℃ to +85℃
Operating Temperature Range	T_use	-10 to +70 / -40 to +85			℃	
Frequency Stability [1]	F_stab	-	-	+75	$\times 10^{-6}$	T_A = -10℃ to +70℃, Vdd: +1.5V to +3.63V
		-	-	+100		T_A = -40℃ to +85℃, Vdd: +1.5V to +3.63V
		-	-	+250		T_A = -10℃ to +70℃, Vdd: +1.2V to +1.5V
Frequency Tolerance [2]	F_tol	-	-	+10	$\times 10^{-6}$	T_A = +25° C, post reflow, Vdd: +1.5V to +3.63V
		-	-	+20		T_A = +25° C, post reflow with board-level underfill, Vdd: +1.5V to +3.63V
First Year Aging	F_aging1	-1.0	-	+1.0	$\times 10^{-6}$	T_A = +25℃
Core Operating Current [3]	Idd	-	+0.9	-	µA	T_A = +25℃, Vdd: +1.8V. No load
		-	-	+1.3		T_A = -10℃ to +70℃, Vdd max: +3.63V. No load
		-	-	+1.4		T_A = -40℃ to +85℃, Vdd max: +3.63V. No load
Start-up Time [4]	T_start	-	180	300	ms	T_A = -40℃ ≦ T_A ≦ +50℃, valid output
		-	-	450		T_A = +50℃ < T_A ≦ +85℃, valid output
LVCMOS Output Option, TA = -40℃ to +85℃, typical values are at T_A = +25℃						
Duty Cycle	DC	48	-	52	%	
Output Low Voltage	V_{OL}	-	-	Vdd×0.1	V	Vdd: +1.5V to +3.63V, I_{OL} = +10 µA, 15 pF
Output High Voltage	V_{OH}	Vdd×0.9	-	-	V	Vdd: +1.5V to +3.63V, I_{OH} = -10 µA, 15 pF
Rise and Fall Time	Tr, Tf	-	100	200	ns	10 to 90% (Vdd), 15 pF load, Vdd = +1.5V to +3.63V
		-	-	50		10 to 90% (Vdd), 5 pF load, Vdd ≧ +1.62V
Packing Unit	1000pcs./reel (φ180) or 3000pcs./reel (φ180)					

[1]. Measured peak-to-peak. Inclusive of Initial Tolerance at +25° C, and variations over operating temperature, rated power supply voltage and load. Stability is specified for two operating voltage ranges. Stability progressively degrades with supply voltage below +1.5V.
[2]. Measured peak-to-peak. Tested with Keysight 53132A frequency counter. Due to the low operating frequency, the gate time must be ≥100 ms to ensure an accurate frequency measurement.
[3]. Core operating current does not include output driver operating current or load current. To derive total operating current (no load), add core operating current + (+0.065 µA/V)×(output voltage swing).
[4]. Measured from the time Vdd reaches +1.5V.